Summary of the Office Action

1. Applicants requests clarification of the check to box 9 in the Office Action, "Application papers", to the effect that the Specification is objected to. The Office Action does not otherwise refer to any objections to the Specification, and thus applicants have not amended their Specification.
2. Claim 3 was objected to for informality.
3. Pending claims 1-20 stand rejected. Specifically, claims 1-10, and 13-20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,969,822 to Fright et al. ("Fright").
4. Claims 11 and 12 stand rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,381,235 to Inoue et al. ("Inoue").

Summary of the Response

Claims 1-20 have been amended. Claim 19 is amended to avoid replicating claim 18, and is supported by Figs. 7, 8, 9, and by the Specification, e.g., page 15, second full paragraph from bottom of the page.

Now pending are claims 1-20.
Claim 3 has been amended to address the informality objection.
Claims 1-20 have been amended to more clearly distinguish over the art of record, to improve readability, and to correct typographical errors.

Please consider the following remarks and arguments.

USP 5,969,822 to Fright is overcome as a 35 USC §103(a) reference

Applicant concedes that Fright describes an optical scanner system to obtain three-dimensional object coordinates using a camera that captures an image of the intersection of an object with a fan beam of light. But Fright differs substantially from Applicant's claimed invention. Specifically, Fright requires a priori knowledge of the relative spatial locations of the camera, the light source, the object itself, and a fourth known point within the space of interest. See for example col. 4, lines 46-47, and 66-67. See also Fright's claim 1, which defines the spatial location system required for his optical scanner.

Fright's location points are defined as spatial location receivers and transmitters. In its teachings, Fright states at col. 6, line 43 that a spatial location transmitter may be attached directly to the object to be detected. Note too that even with his a priori knowledge of the spatial locations of the camera, the light source, the object, and a fourth known point, Fright still can only obtain coordinates for one object at a time, as evidenced by Claim 1 of that reference. As noted, claim 1 includes a spatial location system that obtains the relative positions and orientation of the object, the light source (illumination means), and camera.

By contrast, no spatial reference point need be attached to the object of interest. Indeed, such a constraint is simply not practical for Applicants's occupancy sensing system and method. For example, such a constraint would preclude imaging multiple objects in different regions of the space, which objects are not part of a single rigid body but instead can move independently of one another.

With regard to claims presented herein, it suffices to know a priori relative position of the sensor (or camera) and the light source (or source of optical energy). These positions are obtainable with a one-time calibration run. Once this information is known, the presently claimed invention can determine the spatial location of the object with the light source (or fan beam). Exemplary calculations are defined in equations (1) to (3) in the Specification at pages 12-13.

To recapitulate, the Fright will not function absent a priori positional knowledge of the relative spatial locations of the camera, the light source, the object itself, and a fourth known point in space. By contrast, Applicant's invention, as recited in amended claims 1-10 and 13-20, functions without requiring a priori positional knowledge of the object. Applicants therefore respectfully submit that the presently claimed invention is patentable over the Fright reference, and as such, Fright should be withdrawn as a 35 USC §103(a) reference. In short, amended claims 1-10 and 13-20 are patentable over the Fright reference, and should be passed to allowance.

USP 5,381,235 to Inoue is overcome as a 35 USC §103(a) reference

Inoue was cited as rendering claims 11 and 12 unpatentable. The Examiner asserted that Inoue disclosed what was set forth in claims 11 and 12, but for explicit mention of volume determination. Applicants submit that Inoue is silent with respect to determining actual volume of a shape. Inoue appears to scan an object and then build a three-dimensional view of the images acquired. But Inoue does not address how he would convert is image-acquired measurements to the real-world coordinates required to actual measure the volume of space or space behind the object. Thus while Inoue arguably can recognize an object as being spherical in shape, or shaped like a spool, it does not appear that Inoue can take the next step and arrive at actual volume figures.

By contrast, Applicant's claimed invention knows the appropriate scale factor to apply, by virtue of the known registration between the camera and energy source. Thus while the presently claimed invention can determine actual volume associated with an object, Inoue's invention appears incapable of determining actual volume for an object, but can only recognize the shape of the object.

Inoue's system clearly disposes his light source at one location relative to the object, and places his image sensor "opposed to the object" (see Abstract, Fig. 1, col. 1, lines 23-25, col. 4, lines 33-35, col. 7, line 29-30, col. 8, and lines 3-5.

Applicant's claimed invention further generates optical energy and detects the interaction of an object with at least some of the optical energy, all from the region relative to the object, e.g., applicants's sensor is not "opposed to the object". See Fig. 1, Fig. 2A, Fig. 4, Fig. 5, Fig. 7, Fig. 8, and Fig. 9. While applicants's optical energy source and camera are offset a known registration distance relative to one another, their collective orientation appears inapposite to what is shown in Inoue.

This difference in the disposition of light source and sensor relative to an object is recited in amended claim 11, which distinguishes the claims presented herein from the system or method of Inoue. Further, the claims presented with this application can actually determine volume, whereas at best Inoue appears able to recognize object shape but appears unable to determine actual volume therefrom. Claim 12 depends from and further limits claim 11, and is also distinguished from Inoue. Applicants submit that amended claims 11 and 12 are patentable over what is disclosed or suggested in Inoue.

CONCLUSION

It is Applicants's belief that this Amendment places the application in condition for allowance. Applicants request entry of the amendment and issuance of a Notice of Allowance. The Office is given permission to charge any unpaid fees to Applicants' deposit account (50-1914).

Respectfully submitted,

By ______________________________

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